

Labrusca

RESEARCH REVIEW

November 1999

NEW YORK AND PENN STATE AGRICULTURAL EXPERIMENT STATIONS

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Message from the New York Director

Investment in Research Benefits Grape Industry

Research Benefits Growers

Strong evidence that research pays dividends comes from the data for Concord grapes in Western New York and Erie County, PA. It shows a steady increase in yield from 1975 through 1999. With the current price of Concord grapes at \$275/ton and 30,000 acres in production in WNY and PA, the 0.8 ton/acre increase from 1989-1999 equals an additional \$6.6 million for growers.

AVERAGE CONCORD YIELDS WNY AND PA

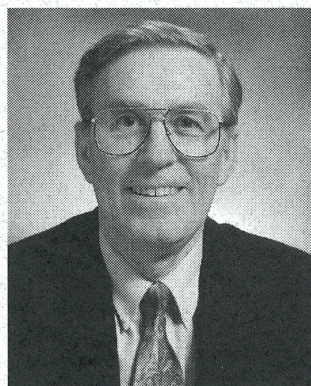
Years	Tons/Acre
1975-1979	3.7
1980-1984	4.9
1985-1989	5.3
1990-1994	6.0
1995-1999*	6.1

* Record or near-record yields were obtained in 1999: 7.0 tons/acre in Western NY and 8.2 tons/acre in PA.

An important reason for this consistent upward trend is growers' adoption of improved production practices developed through research.

The competitiveness of the industry has also been improved by research in mechanization, value-added attributes, and integrated pest management.

Outcomes are never certain for any specific research projects, and progress on a perennial crop like grapes can often be slow. What is certain, though, is that the technologies to grow grapes today would be much less efficient and the cost of production much higher if it were not for the progress that has been made through research and extension programs.



Additional research is required for the labrusca industry to remain competitive in a global economy where new challenges are continually present. Pesticides in use today are in question and health and environmental concerns are increasing, yet pests and diseases plague growers and still need to be addressed. Viticultural practices that better balance efficiency, cost, labor, and the environment still need to be improved. Maximizing yield and quality are perennial challenges. And more research needs to be done on the health benefits of consuming grapes and grape products.

Information in this "Labrusca Research Review" shows how investments made in research and extension over many years at the Experiment Station in Geneva, the Vineyard Lab in Fredonia, and the Lab in North East have been beneficial to labrusca grape growers and processors. Recent success stories are highlighted and research identified that addresses problems important to the long-term success of the grape industry in New York and Pennsylvania. The message is that research and extension directly and positively affects the bottom line of growers and processors. Success is often difficult to measure because of the long-term nature of research on a perennial crop, but, with the benefit of 20/20 hindsight, it is clear that research investments pay dividends for the grape industry.

James E. Hunter
James E. Hunter, Director
New York State
Agricultural Experiment Station
Geneva, NY

Current Research and Recent Accomplishments

How the success of viticulture research is measured is shifting from yield data analysis to assessments of juice quality and sustainability of production, with profitability as the ultimate yardstick. Research is needed to learn how to sustain high yields on an annual basis and avoid fruit-set problems. Also, more research must be focused on what happens to the plant below ground and how this zone can be better managed.

We also now know that the great successes achieved in controlling diseases and insects may be short-lived because pests and pathogens are becoming resistant to new kinds of pesticides. Concerns raised about the possible adverse environmental effects of pesticides and the Food Quality Protection Act make the availability of current pesticides uncertain. What research is being done to address these concerns?

LONG-TERM EXPERIMENTAL BLOCKS

Longstanding trials at the Vineyard Lab in Fredonia look at the interactions of pruning, training, thinning, floor management, fertilization, shoot positioning, and rootstocks on Concord grape yield and quality. These factors continue to be at the core of viticulture research because of their large impact on the Concord grape industry.

FRUIT SET A team of researchers with expertise in nutrition, plant anatomy, and crop production systems is determining the factors limiting adequate fruit set in vines heavily cropped the previous year, including the effect of crop load on the carbohydrate status of vines. Consistent fruit set is a major challenge facing the labrusca industry.

SEASONAL CROP LOAD MANAGEMENT

Researchers are developing a crop load management system to enable every grower to maximize yields at

the desired processor quality, given the growing conditions of that season. Developing this system requires: assessing node fruitfulness in order to determine node number retention; assessing crop potential during the



early part of the growing season; understanding the past history of the yield and quality for each vineyard; thinning the crop when needed; and mechanizing the pruning process.

CULTURAL PRACTICES THAT IMPROVE

PROFITABILITY Research-based cultural practices have been developed that enable growers to be more competitive with grape producers worldwide. These include: vineyard scouting for pests and diseases, and the use of weather stations that have resulted in reduced pesticide use and savings of \$49.73/acre; and new row-middle weed management strategies that are estimated to save grape producers \$23/acre annually.

COMPETITION ON THE VINEYARD FLOOR

Experiments on row-middle management showed that green cover crops competed with vines for water and nutrients, especially just after bloom, and caused yield reductions in dry

years. The competitive effects could not be overcome by irrigating or varying the width of the cover crop. A no-till herbicide application at bloom was better than mulch or cultivation treatments.

VINEYARD WEED MANAGEMENT

New herbicides are being evaluated for their potential to improve weed management, while research on novel nozzle techniques, canopy sprayers and weed detection systems minimizes environmental contamination from herbicide applications.

IRRIGATING CONCORD AND NIAGARA

The benefits of irrigation depend on many factors and appear greatest during vineyard establishment. In established vineyards, benefits are greater in heavy-cropping, minimally-pruned or GDC vineyards, especially with sod middles. Differences between Niagara and Concord are being investigated.

ROOT BIOLOGY

A technique has been adapted for grapes that allows direct observation of roots growing in field soil. Observation has shown that the seasonal pattern of development and lifespan of small feeder roots differs

between minimally- and balance-pruned vines. Studies are underway to determine what environmental and cultural factors affect root growth and survival. The goal is to learn how to manipulate these factors to obtain optimum vine growth and vigor.

FERTILIZER PRACTICES Much of the work on fertilizer requirements for Concord vines was done when yields were much lower. This, plus the fact that high-acid soils limit nutrient availability, makes it essential to re-examine fertilizer requirements on different soil types. Studies are underway to determine the effect of soil pH and nutrient availability on root growth and nutrient uptake, and the effect of nitrogen and boron on vine growth and fruit set.

MANAGING FUNGAL DISEASES

Recently, it was demonstrated that infection of fruit by powdery mildew and black rot fungi occurs only during the first few weeks after bloom, and reduces yield and juice quality. Additional research has shown that control of leaf infections on Concord grapes after this period is beneficial only under specific conditions. Because of this, growers now know that they do not need to apply fungicides after the first or second week of July under typical conditions. A prediction model is being developed to determine when sprays are essential to control downy mildew.

TESTING NEW FUNGICIDES Extensive testing of new fungicides over the last three years has resulted in six new fungicides becoming available to grape growers. Two have been classified as "reduced risk" compounds and control all of the major fungal diseases of labrusca grapes. Research has demonstrated the most efficient ways to use these new materials, and has documented their positive effect on yield and vine health. Other research has documented that some products have dual

benefits, such as a chemical that provides plant nutrients and controls powdery mildew.

FUNGICIDE RESISTANCE The development of resistance to important sterol-inhibiting fungicides has recently been documented for the powdery mildew fungus. Research has demonstrated strategies that will limit the spread of resistance. This information should allow growers to maintain the effectiveness of these products and forestall development of resistance to new fungicides.

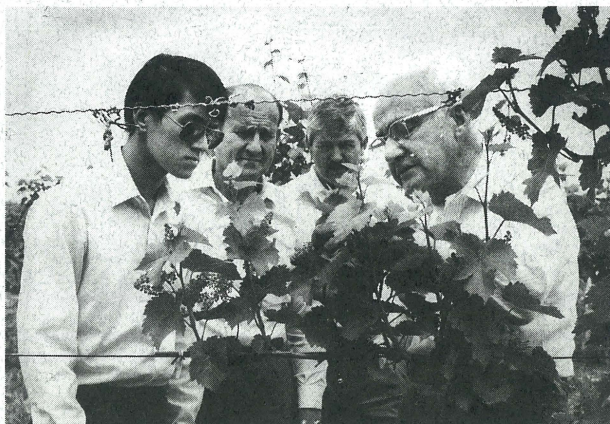
CROWN GALL This bacterial disease can be a significant problem on Niagara grapes. Plants of this variety have been produced via shoot-tip culture that are free of the disease. The first mother blocks with these clean vines are being grown in western New York to provide healthy vines for commercial nurseries.

TESTING NEW INSECTICIDES In spite of new knowledge that has reduced the amount of insecticide applications used on grapes, the search for new insecticides must continue because of the threat of pests becoming resistant to current chemicals. A new product, Provado, has been registered for control of leafhoppers. Also, research continues on a new insect growth regulator called Confirm, which is expected to be registered in the next few years.

ECONOMICAL CONTROL OF INSECTS

Until the late 1980s, growers used three to four insecticide sprays per season. Because of research resulting in the grape berry moth assessment program, they now average one to two sprays without sacrificing yield or quality. Other research revealed that vines with adequate moisture

could tolerate moderate amounts of leafhopper damage without any loss of yield or quality. Research has also shown that each banded grape bug can reduce yield, but one early-season insecticide spray will eliminate this loss. Phenology studies currently in progress will improve management of grape berry moth. Biological control of



the moth using an egg parasitoid has also been shown to be feasible.

ECONOMICS OF PEST MANAGEMENT PRACTICES

It has been estimated that pest management practices developed in the past few years can save growers \$190 per acre. If fully implemented on all labrusca grapes grown in New York and Pennsylvania, this would amount to \$8.3 million saved annually.

PESTICIDE APPLICATION TECHNIQUES

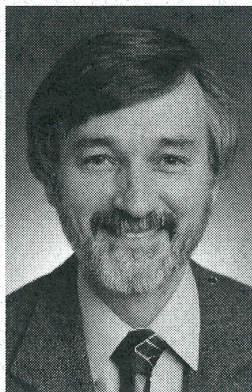
Novel application methods, application rates, and deposition within the canopy as well as drift have been studied. Extension demonstrations have been conducted to raise growers' awareness of factors affecting effectiveness of pesticides applications.

CONCORD IMPROVEMENT PROGRAM

For the past three years, researchers have been trying to adapt genetic engineering techniques to Concord. Although the techniques are still under development, the goals are to improve disease resistance and increase resveratrol levels while not altering the desirable characteristics of Concord.

*Message from the Pennsylvania Director***A Partnership for 2000 and Beyond . . .**

The Lake Erie Regional Grape Program has been instrumental in bringing research and extension talent from Cornell University and Penn State together in partnership with growers and processors from New York and Pennsylvania.



The partnership between the universities and the grape industry has been a healthy one. It has helped researchers focus on problems important to growers and processors, and helped growers adopt new technologies.

This effort has been greatly facilitated by industry leaders who spearheaded efforts to generate research funds and directed them to those research projects most critical to industry needs. The development of new technologies and knowledge to keep the labrusca industry competitive and profitable would quickly disappear if these funds were not available.

Many challenges remain to ensure the viability of the labrusca industry in Pennsylvania and New York. The strong cooperative effort among

growers, processors and researchers fuels our optimism for the future. New York and Pennsylvania researchers and extension educators are working together to enable growers of the Lake Erie Region to increase yields and profits while delivering the quality that producers and consumers expect or demand.

Continued investment in the two-state grape research and extension program will help assure the continued success of the labrusca industry in the new millennium.

A handwritten signature of Paul A. Backman in dark ink.

*Paul A. Backman, Director
Pennsylvania State Agricultural
Experiment Station
University Park, PA*

Health Benefits for Consumers

Cornell researchers identified and quantified resveratrol in Concord grapes. Certain health benefits are derived from the consumption of resveratrol in Concord-based grape juice products and increased sales have been attributed to consumer awareness of this. In 1999, for example, the New York Concord grape crop will likely be the highest per acre in history. This huge crop could have resulted in dramatically reduced prices and some grapes not being harvested. However, as a result of the strong consumer demand—in part due to the health benefits associated with consumption of these products—the industry was able to absorb all the Concord grapes with only a slight decline in prices.

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